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Description

Cosmetic or dermatological preparations containing catechins or green tea extract

The present invention relates to cosmetic or dermatological preparations comprising active ingredients for the care and protection of the skin, in particular sensitive and dry skin and, very particularly, skin aging or aged by intrinsic and/or extrinsic factors, and to the use of such active ingredients and combinations of such active ingredients in the field of cosmetic and dermatological skincare.

The term "cosmetic skincare" primarily means the strengthening or rebuilding of the skin's natural function as a barrier against environmental influences (e.g. dirt, chemicals, microorganisms) and against the loss of endogenous substances (e.g. water, natural fats, electrolytes).

Impairment of this function may lead to increased resorption of toxic or allergenic substances or to attack by microorganisms, leading to toxic or allergic skin reactions.

Another aim of skincare is to compensate for the loss by the skin of lipids and water caused by daily washing. This is particularly important when the natural regeneration ability is insufficient. Furthermore, skincare products should protect against environmental influences, in particular against sun and wind, and delay skin aging.

The horny layer of the skin is distinguished by a particular structure which, on the one hand, protects the skin against the loss of vital cell water or the penetration of external noxae and, on the other hand, stabilizes its own flexibility by binding a defined amount of water: intercellular lipids, consisting of free sterols and fatty acids, and various ceramide classes, form a barrier within the horny layer in the form of extracellular, multilamellar and water-impermeable membrane systems.

The lipid membranes surround the dead corneocytes with stored hygroscopic substances. The horny layer is continuously renewed, fine flakes (corneocytes with adhering lipids) being continually shed on the outside, and keratinized cell and lipid material being subsequently produced on the inside. Thus, in the equilibrium, the regeneration process does not cause any change in the loss of transepidermal water.

Even simple bathing in water without the addition of surfactants will initially cause the horny layer of the skin to swell, the degree of this swelling depending, for example, on the bathing time and its temperature. As well as water-soluble substances, e.g. water-soluble constituents of dirt, substances which are endogenous to the skin which are responsible for the water-binding capacity of the horny layer are also washed off or out. In addition, as a result of surface-active substances endogenous to the skin, fats in the skin are also dissolved and washed out to a certain extent. After the initial swelling, this causes a subsequent significant drying-out of the skin, which may be further intensified by washing-active additives.

In healthy skin these processes are generally of no consequence since the protective mechanisms of the skin can readily compensate for such slight disturbances to the upper layers of the skin. However, even in the case of nonpathological deviations from the norm, e.g. as a result of wear damage or irritations caused by the environment, photodamage, aging skin etc., the protective mechanism of the surface of the skin is impaired. In some circumstances it is then no longer able to fulfill its role by itself and has to be regenerated by external measures.

Moreover, it is known that the lipid composition and amount of the horny layer of pathologically altered, dry and dry but not diseased skin of younger and older people deviates from the normal state found in the healthy normally hydrated skin of a group of the same age. In this connection, the changes in the lipid pattern of very dry, noneczematous skin of patients with atopic eczema represents an extreme case of the deviations which are found in the dry skin of people with healthy skin.

Here, these deviations affect very particularly the ceramides, which are severely reduced in number and additionally have a different composition. Here, the deficit of ceramides 1 and 3 is particularly striking, it being known for ceramide 1 in particular

that it increases in a particular way the order of the lipids in the intercellular membrane systems.

Adverse changes in the lipid membranes of the type described above are possibly based on incorrectly controlled lipid biosynthesis and in the end effect likewise increase transepidermal water loss. In turn, permanent barrier weakening makes skin which is itself healthy more sensitive and can in certain instances contribute to the appearance of eczematous processes in diseased skin.

The effect of ointments and creams on barrier function and hydration of the horny layer usually does not consist in the rebuilding or strengthening of the physical-chemical properties of the lamellae of intercellular lipids. An essential partial effect is based on the mere coverage of the areas of skin treated and the blockage of water resulting therefrom in the horny layer lying below. Co-applied hygroscopic substances bind the water, resulting in a measurable increase in the water content in the horny layer. However, this purely physical barrier can be removed again relatively easily. After use of the product is stopped, the skin then reverts very quickly to the state prior to the start of treatment. Moreover, the skincare effect can decrease upon regular treatment, meaning that ultimately the status quo is again achieved even during treatment. In the case of certain products, the condition of the skin deteriorates temporarily in some circumstances when use is stopped. A permanent product effect is therefore as a rule not achieved or achieved only to a limited extent.

In order to aid deficient skin in its natural regeneration and to strengthen its physiological function, intercellular lipid mixtures have recently increasingly been added to topical preparations which are intended to be used by the skin to rebuild the natural barrier. However, these lipids, but in particular the ceramides, are very expensive raw materials. In addition, their effect is in most cases very much lower than hoped for.

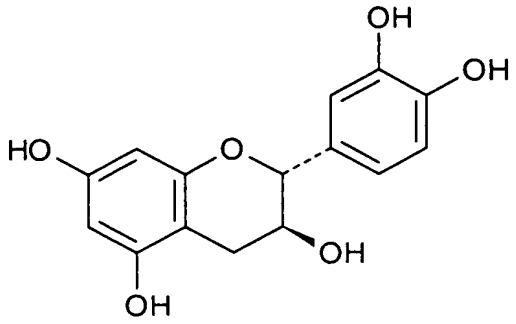
The aim of the present invention was therefore to find ways to avoid the disadvantages of the prior art. In particular, the effect of skincare products should be physiological, rapid and permanent.

According to the invention, these objects are achieved by the use of catechins or gallic esters of catechins or aqeous or organic extracts from plants or parts of plants which

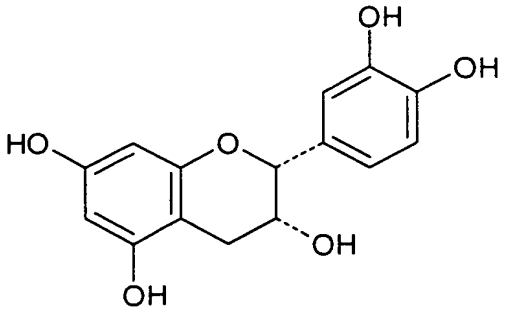
have a content of catechins or gallic esters of catechins, for example the leaves of the Theaceae plant family, in particular of the species Camellia sinensis (green tea) or typical ingredients thereof (such as e.g. polyphenols or catechins, caffeine, vitamins, sugars, minerals, amino acids, lipids), for the prophylaxis, treatment and/or care of dry skin conditions.

Catechins are a group of compounds which are to be regarded as hydrated flavones or anthocyanidines. The catechins form the base substance of a series of natural oligo- or polymeric tannins, e.g. in tea. They occur together with other phenols in many types of fruit and are involved in the browning, catalyzed by phenol oxidases, of areas which have been subjected to pressure or have been cut (e.g. in the case of apples).

The base substance "catechin" (catechol, 3,3',4',5,7-flavanpentol, 2-(3,4-dihydroxyphenyl)chroman-3,5,7-triol) is widespread in plants and occurs, for example, in the catechu. It is characterized by the structural formula



Epicatechin ((2R,3R)-3,3',4',5,7-flavanpentol) is an epimer of catechin and is characterized by the structural formula



The objects according to the invention are likewise achieved by cosmetic or dermatological preparations comprising vegetable extracts with a content of catechins, in particular those preparations which comprise green tea extracts.

Tea originates exclusively from leaves, leaf buds and delicate stems of the tea plant (Camellia sinensis L.), which are processed by methods such as withering, rolling, fermentation, comminution and drying. Black tea is a fermented tea, oolong tea is a semifermented tea whose leaves, following withering and rolling, are fermented for only half of the otherwise customary period and then dried. Green tea is an unfermented product whose leaves are blanched, rolled and dried with retention of the natural leaf dyes.

The composition of the ingredients of tea leaves varies considerably depending on the origin and treatment. On average, black tea comprises 18.9% catechins and catechin tannins, 16.6% proteins, 2.7% caffeine, 10.2% other nitrogen compounds, 4.6% oligosaccharides, 0.6% starch, 11.9% pectin, 7.9% cellulose and 6.1% lignin. Fresh leaves have essentially the same composition but comprise more catechins (26%), fewer nitrogen compounds (8.7%, for the same caffeine content), and 0.8% of inositol. The polyphenol tannins comprise about 80% catechins (main constituent galloyl-(–)-epigallocatechin).

Surprisingly, it has been found that extracts from leaves of plants of the Theales order with the Theaceae family, in particular the species Camellia spec., very particularly the tea types Camellia sinenis, C. assamica, C. taliensis and C. irrawadiensis and hybrids of these with, for example, Camellia japonica increase the synthesis rate of ceramides in human skin in general, but in particular the synthesis rate of ceramides 1, 2 and 3 many times over.

Apart from the catechins (for example catechin and epicatechin), green tea also comprises the gallic esters of these active ingredients, which are likewise effective according to the invention.

The invention further provides for the use of catechins or gallic esters of catechins or aqueous or organic extracts from plants or parts of plants which have a content of catechins or gallic esters of catechins, for example the leaves of the Theaceae plant family, in particular of the species Camellia sinensis (green tea) or typical ingredients

thereof (such as e.g. polyphenols or catechins, caffeine, vitamins, sugars, minerals, amino acids, lipids), for stimulating the sphingolipid synthesis or for strengthening the lipid barrier of human skin.

Skincare products according to the invention advantageously comprise 0.0001-20 percent by weight of catechins or gallic esters of catechins or of aqueous or organic extracts from plants or parts of plants which have a content of catechins or gallic esters of catechins, preferably polyphenols or catechins from the group (-)-catechin, (+)-catechin, (-)-catechin gallate, (-)-gallocatechin gallate, (+)-epicatechin, (-)-epicatechin, (-)-epicatechin gallate, (-)-epigallocatechin and (-)-epigallocatechin gallate.

Cosmetic or dermatological preparations according to the invention preferably comprise 0.001-10% by weight of catechins or gallic esters of catechins or of aqueous or organic extracts from plants or parts of plants which have a content of catechins or gallic esters of catechins, based on the total composition of the preparations.

Cosmetic or dermatological preparations according to the invention very particularly preferably comprise 0.01-1% by weight of catechins or gallic esters of catechins or of aqueous or organic extracts from plants or parts of plants which have a content of catechins or gallic esters of catechins, based on the total composition of the preparations.

The topical preparations according to the invention can be formulated as liquid, paste or solid preparations, for example as aqueous or alcoholic solutions, aqueous suspensions, emulsions, ointments, creams, gels, oils, powders or sticks. Depending on the desired formulation, active ingredients can be incorporated into pharmaceutical and cosmetic bases for topical applications which comprise, as further components, for example oil components, fat and waxes, emulsifiers, anionic, cationic, ampholytic, zwitterionic and/or nonionogenic surfactants, lower monohydric and polyhydric alcohols, water, preservatives, buffer substances, thickeners, fragrances, dyes and opacifiers. The active ingredients according to the invention can also advantageously be used in transdermal therapeutic systems, in particular cubic systems.

It is advantageous to add, to the care topical preparations, additives such as vitamins, coenzymes, substrates and auxiliary factors of the lipid metabolism or of the energy metabolism and other cosmetic or dermatological auxiliaries or active ingredients, for

example pyridoxine, pyridoxal, pyridoxamine, uridine, L-serine, weak carboxylic acids, whose pK_a value is between 3 and 5.5 (e.g. lactic acid and propionic acid), citric acid, pyruvate and cellular energy converters (e.g. creatine, guanine, guanosine, adenine, adenosine, nicotine, nicotinamide, riboflavin), coenzymes (e.g. coenzyme Q_{10}, pantothenic acid, panthenol, liponic acid), auxiliary factors (e.g. L-carnitine), substrates (e.g. hexoses, pentoses, fatty acids), taurocholic acid, lipids (e.g. ceramides, cholesterol, fatty acids, sphingosine, sphingomyelin, glucocerebrosides), substrates (e.g. hexoses, pentoses, fatty acids), glutathione and/or natural moisturizing factors (e.g. amino acids, urea, pyrrolidonecarboxylic acid, glycerol).

It is also advantageous to add antioxidants to the preparations according to the invention. The antioxidants are advantageously chosen from the group consisting of amino acids (e.g. glycine, histidine, tyrosine, tryptophan) and derivatives thereof, imidazols (e.g. urocanic acid) and derivatives thereof, peptides, such as D,L-carnosine, D-carnosine, L-carnosine and derivatives thereof (e.g. anserine), carotinoids, carotenes (e.g. α-carotene, β-carotene, lycopene) and derivatives thereof, chlorogenic acid and derivatives thereof, lipoic acid and derivatives thereof (e.g. dihydrolipoic acid), aurothioglucose, propylthiouracil and other thiols (e.g. thioredoxin, glutathione, cysteine, cystine, cystamine and the glycosyl, N-acetyl, methyl, ethyl, propyl, amyl, butyl and lauryl, palmitoyl, oleyl, γ-linoleyl, cholesteryl and glyceryl esters thereof), and salts thereof, dilauryl thiodipropionate, distearyl thiodipropionate, thiodipropionic acid and derivatives thereof (esters, ethers, peptides, lipids, nucleotides, nucleosides and salts), and sulfoximine compounds (e.g. buthionine sulfoximines, homocysteine sulfoximine, buthionine sulfones, penta-, hexa-, heptathionine sulfoximine) in very low tolerated doses (e.g. pmol to μmol/kg), and also (metal) chelating agents (e.g. α-hydroxy fatty acids, palmitic acid, phytic acid, lactoferrin), α-hydroxy acids (e.g. citric acid, lactic acid, malic acid), humic acid, bile acid, bile extracts, bilirubin, biliverdin, EDTA, EGTA and derivatives thereof, unsaturated fatty acids and derivatives thereof (e.g. γ-linolenic acid, linoleic acid, oleic acid), folic acid and derivatives thereof, ubiquinone and ubiquinol and derivatives thereof, vitamin C and derivatives (e.g. ascorbyl palmitate, Mg ascorbyl phosphate, ascorbyl acetate), tocopherols and derivatives (e.g. vitamin E acetate), vitamin A and derivatives (vitamin A palmitate), and coniferyl benzoate of benzoin resin, rutinic acid and derivatives thereof, α-glycosylrutin, ferulic acid, furfurylideneglucitol, carnosine, butylhydroxytoluene, butylhydroxyanisol, nordihydroguaiacic acid, nordihydroguaiaretic acid, trihydroxybutyrophenone, uric acid and derivatives thereof, mannose and derivatives

thereof, zinc and derivatives thereof (e.g. ZnO, $ZnSO_4$), selenium and derivatives thereof (e.g. selenomethionine), stilbenes and derivatives thereof (e.g. stilbene oxide, trans-stilbene oxide) and the derivatives (salts, esters, ethers, sugars, nucleotides, nucleosides, peptides and lipids) of these said active ingredients which are suitable according to the invention.

Also favorable are those cosmetic and dermatological preparations which are in the form of a sunscreen. In addition to the active ingredient combinations according to the invention, these preferably additionally comprise at least one UV-A filter substance and/or at least one UV-B filter substance and/or at least one inorganic pigment.

It is, however, also advantageous within the meaning of the present inventions to provide those cosmetic and dermatological preparations whose main purpose is not protection against sunlight but which nevertheless have a content of UV protection substances. Thus, UV-A and/or UV-B filter substances are customarily incorporated, for example, into day creams.

Also, UV protection substances, like antioxidants and, if desired, preservatives, also represent effective protection of the preparations themselves against decay.

The preparations according to the invention can advantageously also comprise substances which absorb UV radiation in the UVB region, the total amount of the filter substances being, for example, 0.1% by weight to 30% by weight, preferably 0.5 to 10% by weight, in particular 1.0 to 6.0% by weight, based on the total weight of the preparations, in order to provide cosmetic preparations which protect the hair and/or skin from the entire region of ultraviolet radiation. They can also serve as sunscreens for the hair or the skin.

If the preparations according to the invention comprise UVB filter substances, these may be oil-soluble or water-soluble. Examples of oil-soluble UVB filters which are advantageous according to the invention are:

- 3-benzylidenecamphor derivatives, preferably 3-(4-methylbenzylidene)camphor, 3-benzylidenecamphor;
- 4-aminobenzoic acid derivatives, preferably 2-ethylhexyl 4-(dimethylamino)-benzoate, amyl 4-(dimethylamino)benzoate;

- esters of cinnamic acid, preferably 2-ethylhexyl 4-methoxycinnamate, isopentyl 4-methoxycinnamate;
- esters of salicylic acid, preferably 2-ethylhexyl salicylate, 4-isopropylbenzyl salicylate, homomenthyl salicylate,
- derivatives of benzophenone, preferably 2-hydroxy-4-methoxybenzophenone, 2-hydroxy-4-methoxy-4'-methylbenzophenone, 2,2'-dihydroxy-4-methoxybenzophenone;
- esters of benzalmalonic acid, preferably di(2-ethylhexyl) 4-methoxybenzalmalonate,
- derivatives of 1,3,5-triazine, preferably 2,4,6-trianilino(p-carbo-2'-ethyl-1'-hexyloxy)-1,3,5-triazine.

The list of said UVB filters which can be used in combination with the active ingredient combinations according to the invention are not of course intended to be limiting.

It may also be advantageous to formulate preparations according to the invention with UVA filters which have customarily been present in cosmetic preparations. These substances are preferably derivatives of dibenzoylmethane, in particular 1-(4'-tert-butylphenyl)-3-(4'-methoxyphenyl)propane-1,3-dione and 1-phenyl-3-(4'-isopropylphenyl)propane-1,3-dione.

The invention also provides the combinations of the active ingredients according to the invention, in particular in the topical preparations, with antioxidants, substances of aerobic cellular energy metabolism and/or UV absorbers, by means of which, for example, the stability and the action of the preparation can be improved.

The examples listed above of combinable active ingredients from the given active ingredient groups serve to describe the invention, without there being any intention to limit the invention to these examples.

Moreover, protecting formulation forms can be applied, the substances according to the invention being incorporated (encapsulated), for example, into liposomes, micelles, nanospheres etc. of e.g. hydrogenated amphiphilic agents, such as e.g. ceramides, fatty acids, sphingomyelin and phosphoglycerides, or into cyclodextrans. Further protection can be achieved through the use of protective gas (e.g. N_2, CO_2) during the formulation and the use of gas-tight forms of packaging.

Further auxiliaries and additives may be water-binding substances, thickeners, fillers, perfume, dyes, emulsifiers, active ingredients, such as vitamins, preservatives, water and/or salts.

The groups of substances according to the invention can be incorporated into all cosmetic bases. However, preference is in principle given to W/O and O/W and W/O/W emulsions, hydrodispersions and lipodispersions. Combinations according to the invention can be used particularly advantageously in care products, such as, for example, O/W creams, W/O creams, O/W lotions etc.

The lipid phase can advantageously be chosen from the following group of substances:

- mineral oils, mineral waxes
- oils, such as triglycerides of capric acid or of caprylic acid, but preferably castor oil;
- fats, waxes and other natural and synthetic fatty substances, preferably esters of fatty acids with alcohols of low carbon number, e.g. with isopropanol, propylene glycol or glycerol, or esters of fatty alcohols with alkanoic acids of low carbon number or with fatty acids;
- alkyl benzoates;
- silicone oils, such as dimethylpolysiloxanes, diethylpolysiloxanes, diphenylpolysiloxanes and mixed forms thereof.

The oil phase of the emulsions, oleogels or hydrodispersions or lipodispersions within the meaning of the present invention is advantageously chosen from the group of esters of saturated and/or unsaturated, branched and/or unbranched alkanecarboxylic acids having a chain length of from 3 to 30 carbon atoms and saturated and/or unsaturated, branched and/or unbranched alcohols having a chain length of from 3 to 30 carbon atoms, from the group of esters of aromatic carboxylic acids and saturated and/or unsaturated, branched and/or unbranched alcohols having a chain length of from 3 to 30 carbon atoms. Such ester oils can then advantageously be chosen from the group isopropyl myristate, isopropyl palmitate, isopropyl stearate, isopropyl oleate, n-butyl stearate, n-hexyl laurate, n-decyl oleate, isooctyl stearate, isononyl stearate, isononyl isononanoate, 2-ethylhexyl palmitate, 2-ethylhexyl laurate, 2-hexyldecyl stearate, 2-octyldodecyl palmitate, oleyl oleate, oleyl erucate, erucyl oleate, erucyl

erucate and synthetic, semisynthetic and natural mixtures of such esters, e.g. jojoba oil.

The oil phase can also advantageously be chosen from the group of branched and unbranched hydrocarbons and hydrocarbon waxes, silicone oils, dialkyl ethers, the group of saturated or unsaturated, branched or unbranched alcohols, and fatty acid triglycerides, namely the triglycerol esters of saturated and/or unsaturated, branched and/or unbranched alkanecarboxylic acids having a chain length of from 8 to 24, in particular 12-18, carbon atoms. The fatty acid triglycerides can, for example, advantageously be chosen from the group of synthetic, semisynthetic and natural oils, e.g. olive oil, sunflower oil, soybean oil, groundnut oil, rapeseed oil, almond oil, palm oil, coconut oil, palm kernel oil and the like.

Any mixtures of such oil and wax components can also advantageously be used within the meaning of the present invention. It may also in some instances be advantageous to use waxes, for example cetyl palmitate, as the sole lipid component of the oil phase.

The oil phase is advantageously chosen from the group 2-ethylhexyl isostearate, octyldodecanol, isotridecyl isononanoate, isoeicosane, 2-ethylhexyl cocoate, C_{12-15}-alkyl benzoate, caprylic/capric triglyceride and dicaprylyl ether.

Mixtures of C_{12-15}-alkyl benzoate and 2-ethylhexyl isostearate, mixtures of C_{12-15}-alkyl benzoate and isotridecylisononanoate, and mixtures of C_{12-15}-alkyl benzoate, 2-ethylhexyl isostearate and isotridecyl isononanoate are particularly advantageous.

Of the hydrocarbons, paraffin oil, squalane and squalene are to be used advantageously within the meaning of the present invention.

Advantageously, the oil phase can further have a content of cyclic or linear silicone oils or consist entirely of such oils, although it is preferred to use an additional content of other oil phase components in addition to the silicone oil or the silicone oils.

Cyclomethicone (octamethylcyclotetrasiloxane) is advantageously to be used as the silicone oil to be used according to the invention. However, other silicone oils can advantageously be used within the meaning of the present invention, for example hexamethylcyclotrisiloxane, polydimethylsiloxane and poly(methylphenylsiloxane).

Mixtures of cyclomethicone and isotridecyl isononanoate, and of cyclomethicone and 2-ethylhexyl isostearate are particularly advantageous.

The aqueous phase of the preparations according to the invention optionally advantageously comprises

- alcohols, diols or polyols of low carbon number, and ethers thereof, preferably ethanol, isopropanol, propylene glycol, glycerol, ethylene glycol, ethylene glycol monoethyl or monobutyl ether, propylene glycol monomethyl, monoethyl or monobutyl ether, diethylene glycol monomethyl or monoethyl ether and analogous products, and also alcohols of low carbon number, e.g. ethanol, isopropanol, 1,2-propanediol, glycerol and, in particular, one or more thickeners which may advantageously be chosen from the group silicon dioxide, aluminum silicates, polysaccharides or derivatives thereof, e.g. hyaluronic acid, xanthan gum, hydroxypropylmethylcellulose, particularly advantageously from the group of polyacrylates, preferably a polyacrylate from the group of so-called Carbopols, for example Carbopol grades 980, 981, 1382, 2984, 5984, in each case individually or in combination.

In the technical sense, the term gels means: relatively dimensionally stable, readily deformable disperse systems of at least two components which as a rule consist of a - in most cases solid – colloidally dispersed substance of long-chain molecular groups (e.g. gelatin, silica, polysaccharides) as the backbone-former and a liquid dispersant (e.g. water). The colloidally dispersed substance is often referred to as a thickener or gelling agent. It forms a three-dimensional network in the dispersant, it being possible for individual particles present in colloidal form to be linked to one another more or less firmly via electrostatic interaction. The dispersant which surrounds the network is distinguished by electrostatic affinity for the gelling agent, i.e. a predominantly polar (in particular: hydrophilic) gelling agent preferably gels a polar dispersant (in particular: water), whereas a predominantly nonpolar gelling agent preferably gels nonpolar dispersants.

Strong electrostatic interactions, which are realized, for example, in hydrogen bridge bonds between gelling agent and dispersant, but also between dispersant molecules amongst themselves, can lead to a high degree of crosslinking of the dispersant as well. Hydrogels can consist of virtually 100% of water (in addition, for example, to about

0.2–1.0% of a gelling agent) and have an entirely solid consistency. The water content is present here in ice-like structural elements, meaning that gels therefore do justice to the origin of their name [from Lat. "gelatum" = "frozen" via the alchemistic term "gelatina" (16^{th} century) for the modern term "gelatin"].

Gels according to the invention usually comprise alcohols of low carbon number, e.g. ethanol, isopropanol, 1,2-propanediol, glycerol and water in the presence of a thickener, which in the case of oily-alcoholic gels is preferably silicon dioxide or an aluminum silicate, and in the case of aqueous-alcoholic or alcoholic gels is preferably a polyacrylate.

Preparations according to the invention can, for example, also be formulated as foam baths and shower preparations, solid and liquid soaps or so-called "syndets" (synthetic detergents), shampoos, handwashing pastes, personal hygiene products, specific cleansers for small children and the like.

Preparations according to the invention can optionally advantageously be distinguished by a content of surfactants. Surfactants are amphiphilic substances which are able to dissolve organic nonpolar substances in water. As a result of their specific molecular structure having at least one hydrophilic and one hydrophobic molecular moiety, they are able to reduce the surface tension of water, wet the skin, facilitate the removal and dissolution of dirt, facilitate rinsing and – if desired – control foaming.

The hydrophilic moieties of a surfactant molecule are mostly polar functional groups, for example $-COO^-$, $-OSO_3^{2-}$, $-SO_3^-$, while the hydrophobic moieties are usually nonpolar hydrocarbon radicals. Surfactants are generally classified according to the type and charge of the hydrophilic molecular moiety. In this connection, it is possible to differentiate between four groups:

- anionic surfactants,
- cationic surfactants,
- amphoteric surfactants and
- nonionic surfactants.

Anionic surfactants usually have, as functional groups, carboxylate, sulfate or sulfonate groups. In aqueous solution, they form negatively charged organic ions in acidic or neutral media. Cationic surfactants are characterized virtually exclusively by the presence of a quaternary ammonium group. In aqueous solution they form positively

charged organic ions in acidic or neutral media. Amphoteric surfactants contain both anionic and cationic groups and accordingly in aqueous solution exhibit the behaviour of anionic or cationic surfactants depending on the pH. In strongly acidic media they have a positive charge, and in alkaline media a negative charge. By contrast, in the neutral pH range, they are zwitterionic, as the example below is intended to illustrate:

$RNH_2^+CH_2CH_2COOH\ X^-$ (at pH=2) X^- = any anion, e.g. Cl^-

$RNH_2^+CH_2CH_2COO^-$ (at pH=7)

$RNHCH_2CH_2COO^-\ B^+$ (at pH=12) B^+ = any cation, e.g. Na^+

Polyether chains are typical of nonionic surfactants. Nonionic surfactants do not form ions in an aqueous medium.

A. Anionic surfactants

Anionic surfactants which can be used advantageously are

acylamino acids (and salts thereof), such as

1. acyl glutamates, for example sodium acyl glutamate, di-TEA-palmitoyl aspartate and sodium caprylic/capric glutamate,
2. acylpeptides, for example palmitoyl-hydrolyzed milk protein, sodium cocoyl-hydrolyzed soya protein and sodium/potassium cocoyl-hydrolyzed collagen,
3. sarcosinates, for example myristoyl sarcosinate, TEA-lauroyl sarcosinate, sodium lauroyl sarcosinate and sodium cocoyl sarcosinate,
4. taurates, for example sodium lauroyl taurate and sodium methylcocoyl taurate,
5. acyl lactylates, lauroyl lactylate, caproyl lactylate
6. alaninates,

carboxylic acids and derivatives, such as

1. carboxylic acids, for example lauric acid, aluminum stearate, magnesium alkanolate and zinc undecylenate,
2. ester carboxylic acids, for example calcium stearoyl lactylate, laureth-6 citrate and sodium PEG-4 lauramide carboxylate,
3. ether carboxylic acids, for example sodium laureth-13 carboxylate and sodium PEG-6 cocamide carboxylate,

phosphoric esters and salts, such as, for example, DEA-oleth-10 phosphate and dilaureth-4 phosphate,

sulfonic acids and salts, such as

1. acyl isethionates, e.g. sodium/ammonium cocoyl isethionate,

2. alkylarylsulfonates,
3. alkylsulfonates, for example sodium cocomonoglyceride sulfate, sodium C_{12-14}-olefin sulfonate, sodium lauryl sulfoacetate and magnesium PEG-3 cocamide sulfate,
4. sulfosuccinates, for example dioctyl sodium sulfosuccinate, disodium laureth sulfosuccinate, disodium lauryl sulfosuccinate and disodium undecyleneamido-MEA sulfosuccinate

and

sulfuric esters, such as

1. alkyl ether sulfates, for example sodium, ammonium, magnesium, MIPA, TIPA laureth sulfate, sodium myreth sulfate and sodium C_{12-13} pareth sulfate,
2. alkyl sulfates, for example sodium, ammonium and TEA lauryl sulfate.

B. Cationic surfactants

Cationic surfactants which can optionally be used advantageously are

1. alkylamines,
2. alkylimidazoles,
3. ethoxylated amines and
4. quaternary surfactants,
5. ester quats.

Quaternary surfactants contain at least one N atom which is covalently bonded to 4 alkyl or aryl groups. Irrespective of the pH, this leads to a positive charge. Alkylbetaine, alkylamidopropylbetaine and alkylamidopropylhydroxysultaine are advantageous. The cationic surfactants used according to the invention can also preferably be chosen from the group of quaternary ammonium compounds, in particular benzyltrialkylammonium chlorides or bromides, such as, for example, benzyldimethylstearylammonium chloride, and also alkyltrialkylammonium salts, for example cetyltrimethylammonium chloride or bromide, alkyldimethylhydroxyethylammonium chlorides or bromides, dialkyldimethylammonium chlorides or bromides, alkylamidoethyltrimethylammonium ether sulfates, alkylpyridinium salts, for example lauryl- or cetylpyridinium chloride, imidazoline derivatives and compounds having cationic character, such as amine oxides, for example alkyldimethylamine oxides or alkylaminoethyldimethylamine oxides. In particular the use of cetyltrimethylammonium salts is advantageous.

C. Amphoteric surfactants

Amphoteric surfactants which can be used advantageously are

1. acyl/dialkylethylenediamine, for example sodium acyl amphoacetate, disodium acyl amphodipropionate, disodium alkyl amphodiacetate, sodium acyl amphohydroxypropylsulfonate, disodium acyl amphodiacetate and sodium acyl amphopropionate,
2. N-alkylamino acids, for example aminopropylalkylglutamide, alkylaminopropionic acid, sodium alkylimidodipropionate and lauroamphocarboxyglycinate.

D. Nonionic surfactants

Nonionic surfactants which can be used advantageously are

1. alcohols,
2. alkanolamides, such as cocamides MEA/ DEA/ MIPA,
3. amine oxides, such as cocoamidopropylamine oxide,
4. esters which are formed by esterification of carboxylic acids with ethylene oxide, glycerol, sorbitol or other alcohols,
5. ethers, for example ethoxylated/propoxylated alcohols, ethoxylated/propoxylated esters, ethoxylated/propoxylated glycerol esters, ethoxylated/propoxylated cholesterols, ethoxylated/propoxylated triglyceride esters, ethoxylated/propoxylated lanolin, ethoxylated/propoxylated polysiloxanes, propoxylated POE ethers and alkyl polyglycosides, such as lauryl glucoside, decyl glycoside and cocoglycoside,
6. sucrose esters, sucrose ethers
7. polyglycerol esters, diglycerol esters, monoglycerol esters
8. methylglucose esters, esters of hydroxy acids.

The examples below serve to illustrate the present invention. Unless stated otherwise, the amounts, percentages or parts are based on the weight, in particular on the total weight of the preparations or of the respective mixture.

Example 1

Skin cream of the W/O type

	% by wt.
Vaseline German Pharmacopeia (GP) 9	13.0
Glycerol GP 9	6.30
Paraffin oil	40.80
Cetylstearyl alcohol/PEG-40 castor oil/sodium cetylstearyl sulfate (Eutanol® G, Henkel KGaA)	2.50
Green tea extract	3.00
Perfume, preservative, dyes	q.s.
Water	ad 100.00

The green tea extract is stirred into the water phase. The fatty phase is added to the 75°C-warm water phase, stirred and homogenized until a uniform cream has formed.

Example 2

Skin cream of the W/O type

	% by wt.
PEG-1 glyceryl oleostearate + paraffin wax	8.00
Vaseline GP	2.80
Paraffin wax/paraffin	1.80
Paraffin oil	12.00
Ceresin	2.20
Octyldodecanol	10.00
Propylene glycol	1.00
Glycerol	1.00
Magnesium sulfate	0.70
Perfume, preservative, dyes	q.s.
Water, demineralized	ad 100.00

The green tea extract is stirred into the water phase. The fatty phase is added to the 75°C-warm water phase, stirred and homogenized until a uniform cream has formed.

Example 3

Skin cream of the O/W type

	% by wt.
Octyldodecanol (Emulgade ® F, Henkel KGaA)	9.30
Cetearyl alcohol/PEG-40 paraffin oil	7.80
Castor oil/sodium cetearyl sulfate (Eutanol ® G, Henkel KGaA)	3.70
(-)-Epigallocatechin gallate	1.00
Glycerol GP 9	4.50
Perfume, preservative, dyes	q.s.
Water, demineralized	ad 100.00

(-)-Epigallocatechin gallate is dissolved in the water phase. The fatty phase is added to the 75°C-warm water phase, stirred and homogenized until a uniform cream has formed.

Example 4

O/W lotion

	% by wt.
Steareth-2	3.00
Steareth-21	2.00
Cetylstearyl alcohol/TEG-40-castor oil/sodium cetylstearyl sulfate (Eutanol ® G, Henkel KGaA)	2.50
Paraffin oil	15.00
Propylene glycol	1.00
Glycerol	3.00
(-)-Catechin	1.20
Perfume, preservative, dyes	q.s.
Water, demineralized	ad 100.00

(-)-Catechin is dissolved in the water phase. The fatty phase is then added to the 75°C-warm water phase, stirred and homogenized until a uniform pale yellow solution has formed.

Example 5

O/W lotion

	% by wt.
Octyldodecanol (Emulgade F, Henkel KGaA)	5.60
Cetylstearyl alcohol/TEG-40-castor oil/sodium cetylstearyl sulfate (Eutanol ® G, Henkel KGaA)	8.90
Cetearyl isononanoate (Cetiol® 5N, Henkel KGaA)	7.50
Paraffin oil	10.50
(-)-Gallocatechin gallate	5.00
Glycerol GP 9	4.70
Perfume, preservative, dyes	q.s.
Water, demineralized	ad 100.00

(-)-Gallocatechin gallate is dissolved in the water phase. The fatty phase is then added to the 75°C-warm water phase, stirred and homogenized until a uniform emulsion has formed.

Example 6

Skin oil

	% by wt.
Glyceryl tricaprylate (Miglyol ® 812, Dynamit Nobel)	21.00
Hexyl laurate (Cetiol ® A, Henkel KGaA)	20.00
Octyl stearate (Cetiol ® 886, Henkel KGaA)	20.00
Paraffin oil	36.00
Green tea extract	3.00

The components are stirred at 25°C until a uniform clear mixture has formed.